



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Fredberg, et al.
Serial No.: 10/620,884
Filed: July 16, 2003
For: RADOME WITH POLYESTER-
POLYARYLATE FIBERS AND A
METHOD OF MAKING SAME

Examiner: Singh, Arti R.
Group: 1771
Docket No.: RAY-132J

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to Mail Stop AF, Commissioner for Patents, Alexandria, VA 22313-1450, on June 8, 2006.


Olga Kadish

DECLARATION OF MARVIN I. FREDBERG PURSUANT TO 37 CFR § 1.132

- 1) In 1971 I received a Bachelor of Science degree in Mechanical Engineering from Tufts University.
- 2) Since 1971 I have worked for Raytheon Company in the field of radomes, and I am currently employed at Raytheon Company.
- 3) I am one of the co-inventors of U.S. Pat. App. No. 10/620,884.
- 4 Rigid radomes made of rigid panels using a rigid resin matrix and radomes made

of a flexible composite fabric material using a flexible resin matrix are two types of known radomes. One skilled in the art would readily recognize the difference between these two types of radomes. It is known that rigid panel radomes typically have significant flexural and compressive strength and modulus material properties while radomes made of flexible composite fabric material typically have very low to no flexural and compressive strength and modulus characteristics. Even without quoting such ranges or any specific degrees or units of flexural and compressive modulus and strength, those skilled in the art know the difference between these two distinct types of radomes and would not view a radome comprised of a flexible composite fabric material in a flexible resin matrix as an obvious variant of a radome of rigid panels in a rigid resin. The meaning of the words describing each of these two types of radomes is plain and would be so to one skilled in the art, including myself.

- 5) While a radome made of rigid panels in a rigid resin matrix may possibility “flex” under extreme conditions such as being struck by artillery, a reasonable interpretation of these words, in a patent, patent application, in the lab, field or otherwise, would not include the possibility of such extreme conditions and would not change the proper interpretation of each type of radome when such radomes are discussed.
- 6) Additionally, U.S. Pat. No. 4,506,269 to *Greene* teaches a radome including a C-sandwich wall. One skilled in the art would understand the difference between

Greene's C-sandwich wall radome and a radome comprising a flexible composite fabric material and a flexible resin matrix material. C-sandwich walls include a core and posts and are used in application such as aircraft, land based and maritime radar and communication antennas where a rigid shell is used to resist externally applied loads such as wind. In these cases all loads are reacted through a combination of significant flexural, tension, compression, and sheer material properties. Radomes comprised of flexible fabric are also used for radar and communications antennas, but some in some applications which are mostly land based, the improved radio frequency performance of a very thin membrane, lacking the flexural and compression characteristics of a rigid construction material, offers an attractive alternative. In these cases, the absence of significant flexural and compression properties offered by rigid materials, necessitates an alternative load reaction mechanism, which may be either internal air at elevated pressure or tension applied at the perimeter of the radome, combined with only the material tensile and shear characteristics. This practice has been applied to several land base and some maritime radar and communications antennas, and in the case of this claimed invention, include polyester-polyester polyarylate fibers for structural support and strength and for increased transmission of RF waves. This combination allows achievement of a balance between radome strength, thickness, and transmission qualities that was not previously known. The C-sandwich wall taught by *Greene* not only serves different purposes than the applicants' claimed radome, but the C-sandwich construction can interfere with RF transmission. In other words, the structural aspect of the C-sandwich radome, namely cores and

posts interferes with RF transmission, while the structural aspect of the applicants' claimed invention – i.e. the polyester-polyarylate fibers – allow for greater RF transmission than such a C-sandwich construction.

- 7) I, the undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001, and that such willful false statements may jeopardize the validity of this document, the patent application or any patent resulting therefrom, declare that all statements made of my own knowledge are true and all statements made upon information and belief are believed to be true.

6/7/06
Date

Marvin I. Fredberg
Marvin I. Fredberg